

3050R-02

What is claimed is:

1. A composition comprising:
  - (a) a major amount of an API Group I mineral oil base stock containing at  
5 least 300 ppm sulfur by weight;
  - (b) a molybdenum dithiocarbamate in an amount suitable to provide about  
25 to about 600 ppm molybdenum to the composition;
  - (c) a succinimide dispersant based on a polyolefin-substituted succinic  
structure, where the polyolefin has a number average molecular weight of at least  
10 about 1300;
  - (d) a zinc dialkyldithiophosphate derived from at least one secondary  
alcohol; and
  - (e) at least one oxidation inhibitor selected from the group consisting of  
hindered phenols, alkylated aromatic amines, and sulfurized olefins.
- 15 2. The composition of claim 1 wherein the mineral oil base stock con-  
tains at least 1000 ppm sulfur by weight.
3. The composition of claim 1 wherein the molybdenum dithiocarbamate  
is represented by the formula
 
$$[R_1R_2N-C(=S)S-]_2-(Mo_2S_mO_n)$$
 20 wherein  $R_1$  and  $R_2$  are independently hydrocarbyl groups, aminoalkyl groups, or  
acylated aminoalkyl groups,  $m$  is 2 and  $n$  is 2.
4. The composition of claim 1 wherein the amount of the molybdenum  
dithiocarbamate is suitable to provide about 50 to 500 ppm by weight molybde-  
num to the composition.
- 25 5. The composition of claim 1 wherein the polyolefin substituent on the  
succinimide dispersant is polyisobutene having a number average molecular  
weight of 1500 to 3000; there are an average of about 1.3 to about 2.5 succinic  
groups on each polyisobutene group; and the amine portion of the succinimide is  
a mixture of ethylene polyamines, which is reacted in an amount to provide a  
30 CO:N mole ratio of about 0.7 to about 1.5.
6. The composition of claim 1 wherein the amount of the succinimide  
dispersant is about 0.4 to about 10 percent by weight of the composition.
7. The composition of claim 1 wherein the zinc dialkyldithiophosphate is  
derived from 4-methyl-2-pentanol or isopropyl alcohol or mixtures thereof.
- 35 8. The composition of claim 1 wherein the amount of the zinc dialkyldi-  
thiophosphate is an amount suitable to provide about 0.03 to about 0.16 weight  
percent phosphorus to the composition.

9. The composition of claim 1 wherein at least two oxidation inhibitors are present.

10. The composition of claim 1 wherein the amount of the oxidation inhibitors is about 0.5 to about 3.5 weight percent of the composition.

5 11. A method for inhibiting oxidation in high sulfur API Group I base stocks, comprising the following steps:

(a) adding to said base stock an additive package which is capable of passing a Sequence IIIF test when formulated in Group II base stocks; and

10 (b) adding to said base stock a molybdenum dithiocarbamate in an amount sufficient to deliver about 25 to about 600 ppm of molybdenum to the composition.

15 12. The method of claim 11 wherein the additive package of (a) comprises (i) a succinimide dispersant based on a polyolefin-substituted succinic structure, where the polyolefin has a number average molecular weight of at least about 1500;

(ii) a zinc dialkyldithiophosphate derived from at least one secondary alcohol; and

20 (iii) at least one oxidation inhibitor selected from the group consisting of hindered phenols, alkylated aromatic amines, and sulfurized olefins.